

SOME  
PHILIPPINE  
UPPER TERTIARY  
FORAMINERA

BY

Benjamin Daleon

A THESIS  
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THE DEGREE OF MASTER OF SCIENCE IN GEOLOGY

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## SOME PHILIPPINE UPPER TERTIARY FORAMINIFERA

By B. A. Daleon

### Introduction -

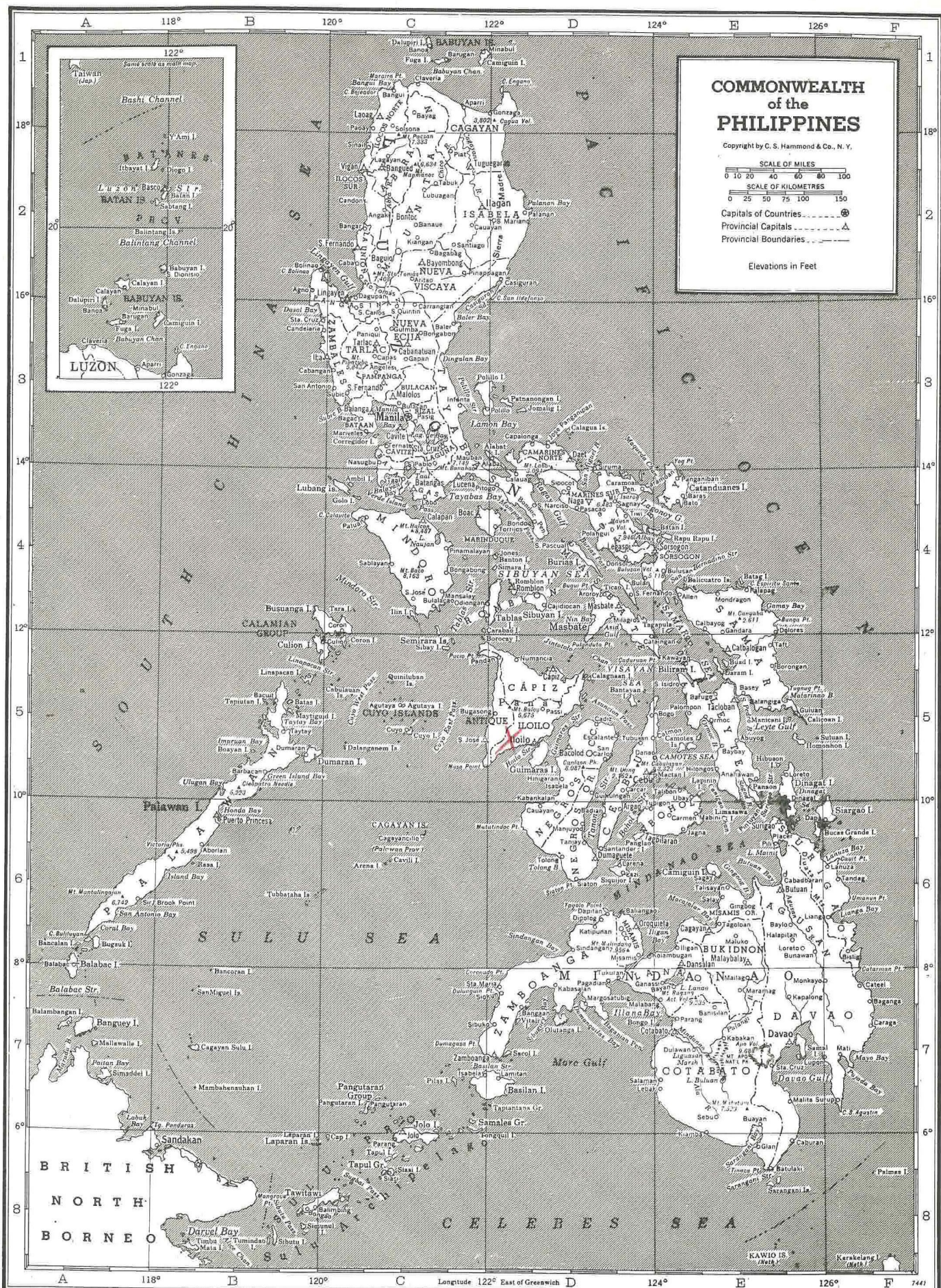
A geological reconnaissance for oil was started by the Philippine Commonwealth on the spring of 1929, which yielded a good collection of foraminifera. Since very little work had been done on the paleontology and stratigraphy of the Philippines previous to this survey only meager information could be obtained from literature. Consequently, a tentative check list had to be set up as types for the biostratigraphy of the islands. Because of the economic nature of the survey, however, the time-consuming specific identification of the foraminifera was not attempted. Instead a generic identification with tentative species number was utilized and found sufficient for internal correlation. It is evident that a subsequent specific identification is necessary in order to give an interregional significance to the sections and localities where these foraminifera were obtained. Here such a task has been attempted in so far as the facilities at hand would permit.

The foraminifera used here came from the upper tertiary biostratigraphic section in Panay Island, Philippines. The lower limit was obtained by correlation of the associated orbitoids with the better known faunas in the Netherlands East Indies to which they are apparently related. Their upper limit, on the other hand was tied in through the associated mollusks.

Identification was done on the basis of the figures and accompanying descriptions of the species as recorded on the following publications;-

- ~~1. Ellis and Messina - "Catalogue of Foraminifera" American Museum of Natural History.~~
2. Cushman, J.A. - "Foraminifera of the Philippine and Adjacent Seas" United States National Museum, Bulletin 100 v. 4/
3. LeRoy, L.W. - "Small foraminifera from the Late Tertiary of the Netherlands East Indies" Colorado School of Mines Quarterly, V.26, n.1.
4. Kleinpell, R.M. - "Miocene Stratigraphy of California" The American Association of Petroleum Geologists.





X - Type Section in Panay Island





# INDIA and CEYLON

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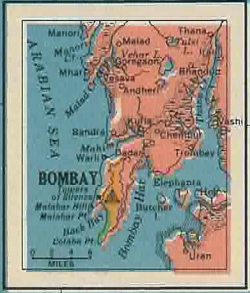
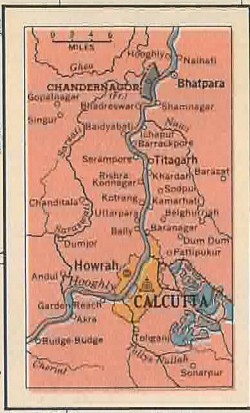
SCALE OF MILES  
0 50 100 200 300

SCALE OF KILOMETRES  
0 50 100 200 300

- Capitals of Countries ★
- Provincial and State Capitals ▲
- International Boundaries ———
- Provincial Boundaries - - - - -
- Native State Boundaries ·····

## POPULATION SCALE

- Over 500,000 ●
- 250,000 - 500,000 ○
- 100,000 - 250,000 ○
- 50,000 - 100,000 ○
- Less than 50,000 ○





# FORAMINIFERAL IDENTIFICATION

Generic Identification  
(with temp. Sp. no.)

Probable Species Identity

Anomalina 3 . . . . .	Anomalina cf. californiensis Cushman & Hobson
Anomalina 4 . . . . .	Anomalina cf. salinasensis Kleinpell
Anomalina 5 . . . . .	Anomalina ammonoides (Reuss)
Anomalina 7 . . . . .	Anomalina cf. coronata Parker & Jones
Bathysiphon 2 . . . . .	Bathysiphon cf. eocenica Cushman & Hanna
Bolivina 2 . . . . .	Bolivina cf. marginata Cushman
Bolivina 3 . . . . .	Bolivina cf. alazanensis Cushman
Bolivina 4 . . . . .	Bolivina aff. halageensis Kleinpell
Bolivina 5 . . . . .	Bolivina cf. californica Cushman
Bolivina 8 . . . . .	Bolivina cf. advena var. ornata Cushman
Bolivina 9 . . . . .	Bolivina alata (Seguenza)
Bolivina 10 . . . . .	Bolivina cf. goudkoffi Rankin
Bolivina 12 . . . . .	Bolivina cf. vaughani Natland
Bolivina 13 . . . . .	Bolivina advena var. striatella Cushman
Bolivina 15 . . . . .	Bolivina brevior Cushman
Bolivina 19 . . . . .	Bolivina aff. modeloensis Cushman & Kleinpell
Bolivina 23 . . . . .	Bolivina hatkeniana Brady
Bolivina 28 . . . . .	Bolivina cf. barberana Cushman & Kleinpell
Bolivinita 1 . . . . .	Bolivinita quadrilatera (Schwager)
Bulimina 2 . . . . .	Bulimina cf. ovata d'Orbigny
Bulimina 6 . . . . .	Bulimina corrugata Cushman and Siegfus
Bulimina 7 . . . . .	Bulimina inflata Seguenza
Bulimina 8 . . . . .	Bulimina ovula d'Orbigny



Generic Identification  
(with temp. Sp. no)

Probable Species Identity

Bulimina 9 . . . . .	Bulimina cf. inflata var. alligata Cushman & Laiming
Bulimina 11. . . . .	Bulimina cf. pseudotorta Cushman
Bulimina 13 . . . . .	Bulimina cf. pyrula d'Orb. var. perversa Cushman
Buliminella 1 . . . . .	Buliminella cf. curta Cushman
Buliminella 3 . . . . .	Buliminella cf. subfusiformis Cushman
Buliminella 4 . . . . .	Buliminella cf. brevior Cushman
Cassidulina 3 . . . . .	Cassidulina aff. globosa Hantken
Cassidulina 4 . . . . .	Cassidulina aff. modeloensis Rankin
Cassidulina 5 . . . . .	Cassidulina cf. subglobosa Brady
Cassidulina 7 . . . . .	Cassidulina cf. delicata Cushman
Cassidulina 8 . . . . .	Cassidulina af. crassa d'Orbigny
Cibicides 1 . . . . .	Cibicides cf. martinesinsis Cushman and Barksdale
Cibicides 3 . . . . .	Cibicides cf. americanus Cushman
Cibicides 13 . . . . .	Cibicides cf. pseudo-ungeriensis (Cushman)
Clavulina 1 . . . . .	Clavulina communis d'Orbigny
Dentalina 1 . . . . .	Dentalina cf. pacifica Cushman
Dentalina 2 . . . . .	Dentalina spinosa d'Orbigny
Dentalina 3 . . . . .	Dentalina quadrulata Cushman and Laiming
Dentalina 7 . . . . .	Dentalina obliquesuturata Stache
Dentalina 9 . . . . .	Dentalina aff. multilinea Bornemann
Dentalina 10 . . . . .	Dentalina aff. vagina Stache
Dentalina 12 . . . . .	Dentalina consobrina d'Orbigny
Dentalina 13 . . . . .	Dentalina aff. acuta d'Orbigny
Ehrenbergina 1 . . . . .	Ehrenbergina cf. pacifica Cushman
Elphidium 7 . . . . .	Elphidium aff. oregonenses Cushman & Grant
Eponides 3 . . . . .	Eponides cf. guyabalensis Cole
Eponides 23 . . . . .	Eponides margaritiferus (Brady)

Generic Identification  
(with temporary Sp no)

Probable Species Identity

Flintina 3 . . . . .	Flintina bradyana Cushman
Frondicularia 4 . . . . .	Frondicularia cf. fliscea Schwager
Frondicularia 5 . . . . .	Frondicularia cf. plicata Cushman
Frondicularia 7 . . . . .	Frondicularia cf. advena Cushman
Gaudryina 2 . . . . .	Gaudryina cf. triangularis Cushman
Glandulina 1 . . . . .	Glandulina cf. laevigata d'Orbigny
Glandulina 3 . . . . .	Glandulina cf. laevigata d'Orbigny
Globigerina 2 . . . . .	Globigerina bulloides d'Orbigny
Globigerinoides 1 . . . . .	Globigerinoides cf. rubra (d'Orbigny)
Globigerinoides 2 . . . . .	Globigerina conglobata Brady
Guttulina 1 . . . . .	Guttulina cf. hughesi Cushman and Laiming
Gyroïdina 5 . . . . .	Gyroïdina cf. soldanii d'Orbigny
Lagena 11 . . . . .	Lagena hexagona (Williamson) var. lata
Lenticulina 1 . . . . .	Lenticulina cf. convergens Bornemann
Marginulina 1 . . . . .	Marginulina cf. mexicana Ehrenberg
Marginulina 3 . . . . .	Marginulina dubia Neugeboren
Marginulina 8 . . . . .	Marginulina cf. subbullata Guembel
Nodogenerina 10 . . . . .	Nodosaria lepidula var. hispidula Cushman
Nodosaria 5 . . . . .	Nodosaria arundinea Schwager
Nodosaria 6 . . . . .	Nodosaria cf. acuminata Hantken
Nodosaria 9 . . . . .	Nodosaria cf. pyrula var. rugosa d'Orbigny
Nonionella 1 . . . . .	Nonionella cf. miocenica Cushman
Orbulina 1 . . . . .	Orbulina universa d'Orbigny
Planorbulinella 1 . . . . .	Planorbulinella larvata (Parker & Jones)
Planularia 2 . . . . .	Planularia cf. markleyana Church



Generic Identification  
(with temp. Sp. no.)

Probable Species Identity

Planulina 2 . . . . .	Planulina cf. arimenensis d'Orbigny
Planulina 5 . . . . .	Planulina cf. arimenensis d'Orbigny
Plectofrondicularia 2 . .	Plectofrondicularia miocenica Cushman
Plectofrondicularia 5 . .	Plectofrondicularia cf. californica Cushman & Stewart
Plectofrondicularia 6 . .	Plectofrondicularia aff. cookei Cushman
Plectofrondicularia 7 . .	Plectofrondicularia cf. vaughani Cushman
Polymorphina 1 . . . . .	Polymorphina cf. problema var. indica Cushman
Pseudoglandulina 1 . . . .	Pseudoglandulina acuta Le Roy
Pullenia 1 . . . . .	Pullenia cf. bulloides d'Orbigny
Pullenia 2 . . . . .	Pullenia cf. salisburyi ReE. & K.C. Stewart
Robulus 18 . . . . .	Robulus costata (Fictel & Moll) var. multicosta
Robulus 28 . . . . .	Robulus costata var. subdecorata Cushman
Rotalia 1 . . . . .	Rotalia beccarii (Linnaeus)
Saracenaria 2 . . . . .	Saracenaria cf. schencki Cushman & Hobson
Siphogenerian 2 . . . . .	Siphogenerian cf. kleinpelli Cushman
Siphogenerina 3 . . . . .	Siphogenerina cf. raphanus var. costulata Cushman
Textularia 2 . . . . .	Textularia cf. mexicana Cushman
Textularia 3 . . . . .	Textularia cf. shivelyi Kleinpell
Textularia 4 . . . . .	Textularia cf. mississippiensis Cushman
Uvigerina 1 . . . . .	Uvigerina cf. glabrans Cushman
Uvigerina 4 . . . . .	Uvigerina cf. gallowayi Cushman
Uvigerina 6 . . . . .	Uvigerina auberiana d'Orbigny
Uvigerina 7 . . . . .	Uvigerina hispida Schwager
Uvigerina 8 . . . . .	Uvigerina schwageri Prady
Uvigerina 18 . . . . .	Uvigerina asperula Ozjsek
Uvigerina 24 . . . . .	Uvigerina tenuistriata Reuss

EUROPE		Series	STAGE
MIO-PLIOCENE PLIOCENE			
Sicilian			
Astian			
Plaisancian			
Pontian			
Sarmatian			
Tortonian			
Helvetian			
Burdigalian (1st Med.Stage))			
MIOCENE			
Aquitanian			
Chattian			

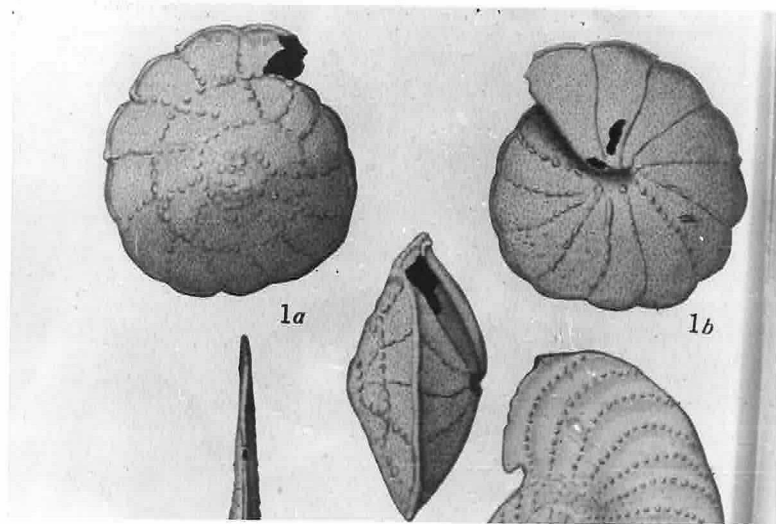
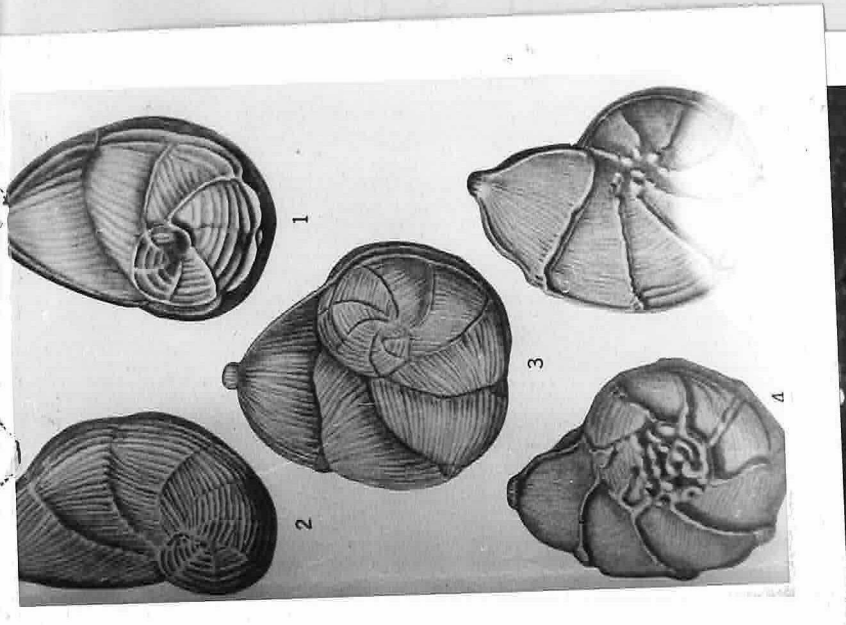
PHILIPPINES		
Series or Stage	Stage or Zone	
Z	Upper	
	Lower	
Y		
X	Upper	
	Middle	
	Lower	
W	Upper	
	Middle	
	Lower	

NORTH AMERICAN WEST COAST		Stage or Formation
L. San Pedro Fm.		
Sta. Barbara Fm.		
Pico Formation		
"Lower Pliocene"		
Delmontian		
Mohnian		
Luisian		
Relizian		
Saucesian		

SOME SUPPOSED AGE EQUIVALENTS OF THE SUBDIVISIONS OF THE PHILIPPINE UPPER TERTIARY



Plate 1



From the U.S. National Museum  
Bulletin 100, Vol. 4, Pl. 47

Fig. 1. *Cristellaria costata* X33  
2, 3. *Cristellaria costata*,  
var. *multicosta* X 26  
4, 5. *Cristellaria costata*,  
var. *subdecorata*. X 26.

601 W

From U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 74

*Truncatulina margaritifera*  
(Brady) X23

Fig. 1 a, dorsal view  
b, ventral view  
c, apertural view

100



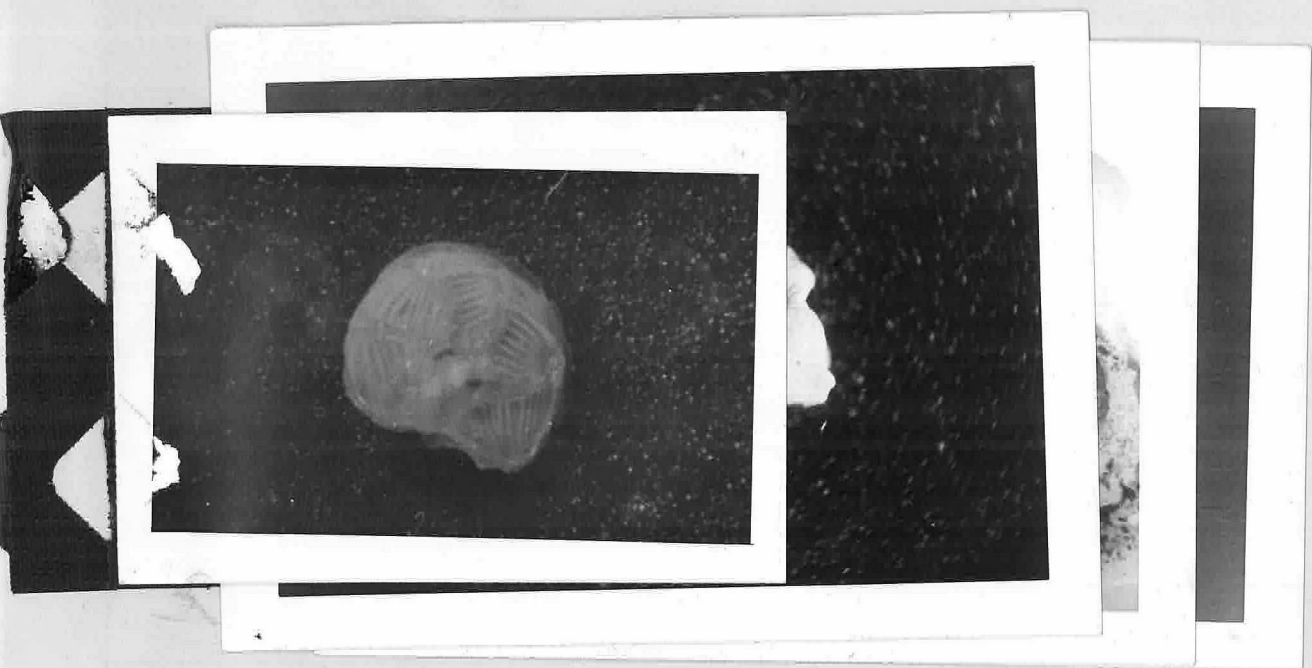
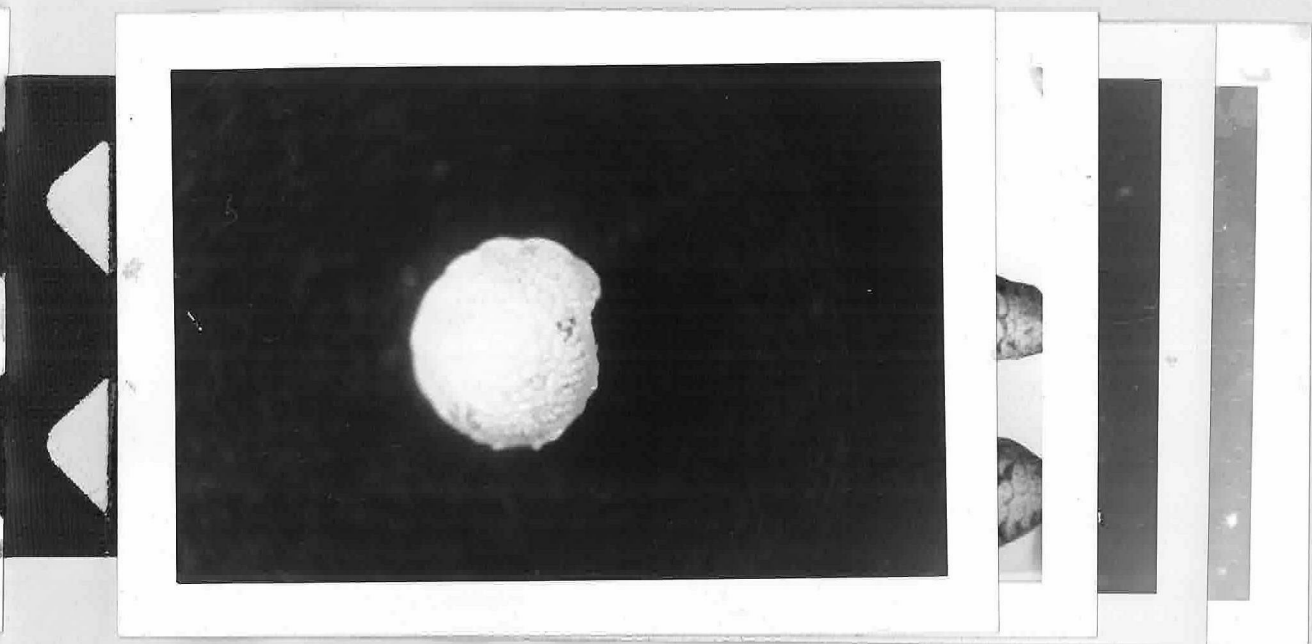


Plate 1

Eponides 23

Eponides margaritifera (Brady)

601 W

Robulus 28

Robulus costata  
var. subdecorata  
Cushman

601 W

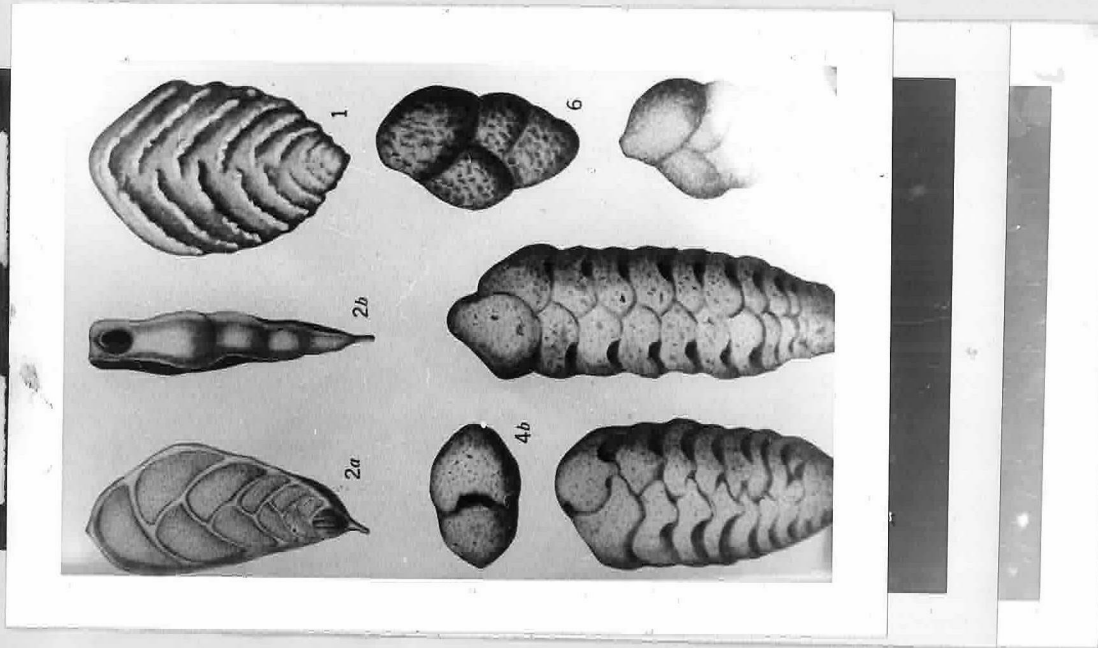


Plate 1



Robulus 18

Robulus costata (Fictel & Moll)  
var. multicoستا Cushman

A 109

From U.S. Nat. Museum  
Bulletin 100. Vol. 4 Pl. 23

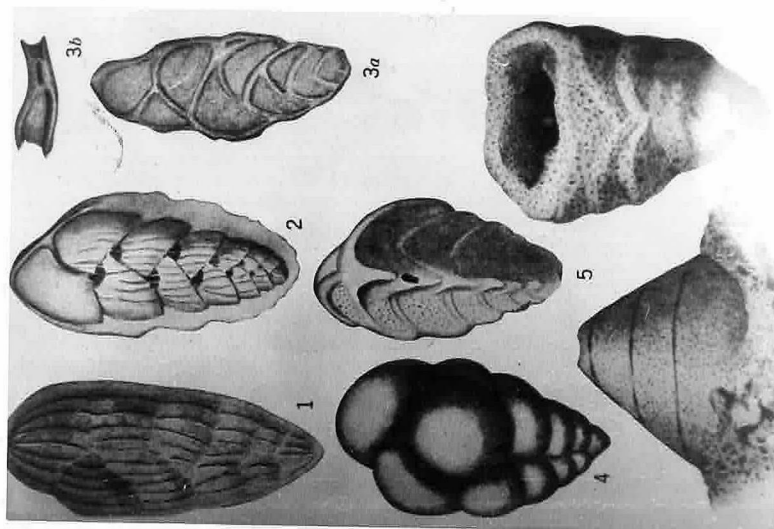
2. Bolivinita (Textularia)  
quadrilatera (Schwager)

2.a, front view

2.b, side view

x 75

601



From U.S National Museum  
Bulletin 100, Vol.4 Pl. 27

No.2

*Bolivina hantkeniana* Brady

*Bolivinita* 1

*Bolivinita quadrilatera*  
(Schwager)



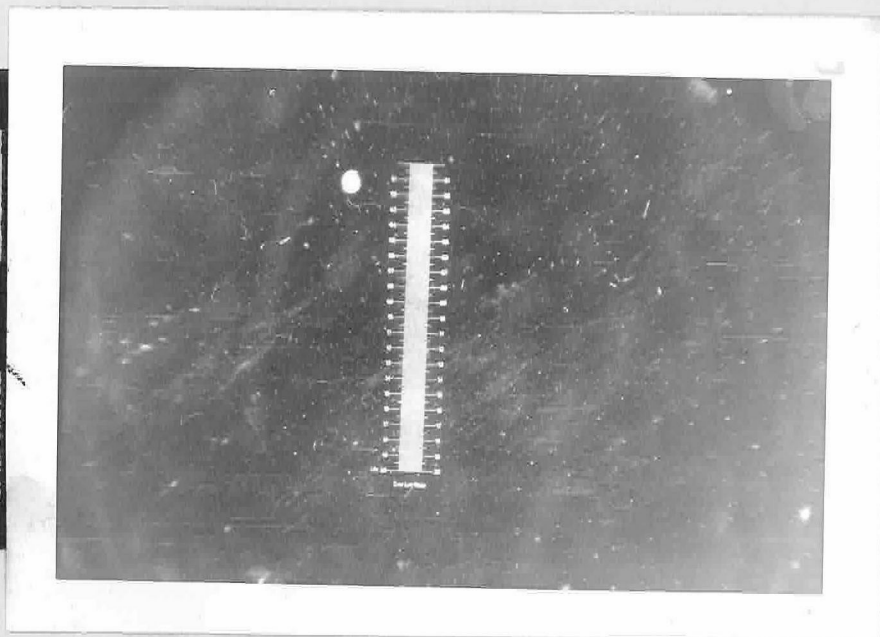


Plate 1

Bolivina 23

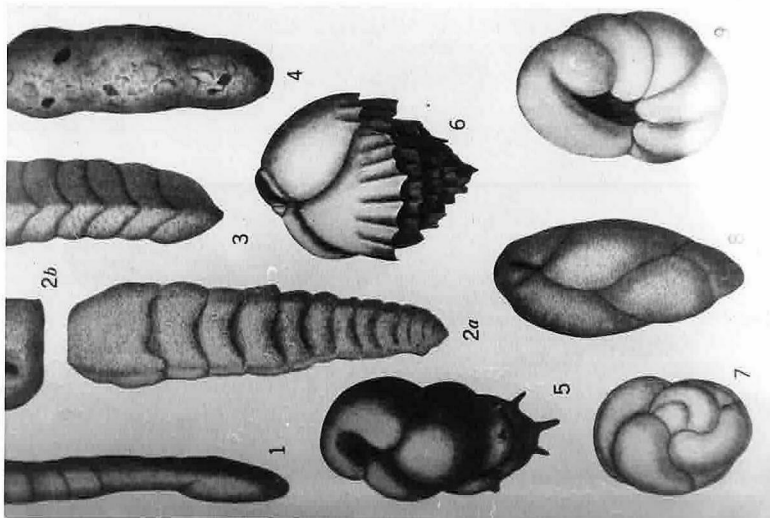
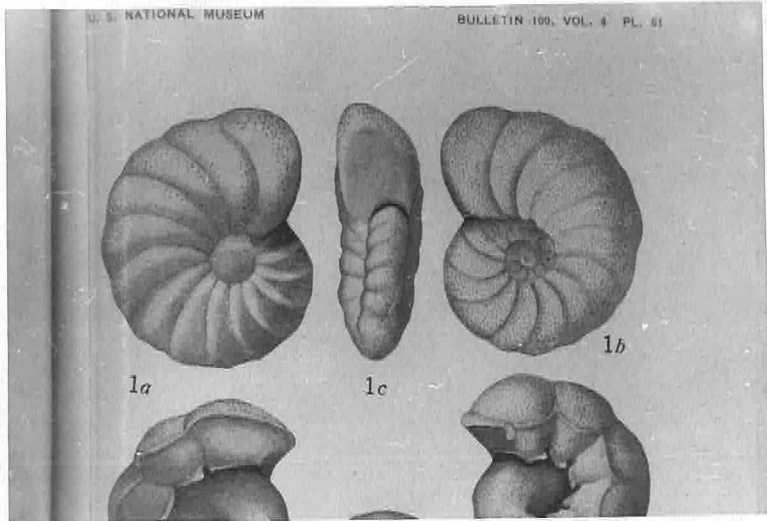
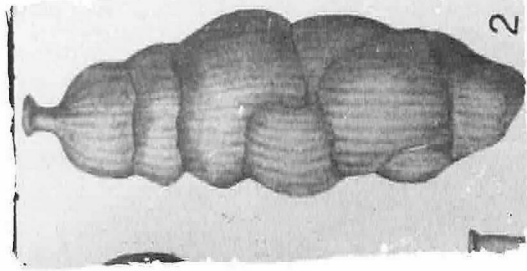
Bolivina hantkeniana Brady

Magnification of 2 mm rule  
divided into 200 to show  
scale of foraminifera



Identified Species still found in the Philippine and Adjacent seas as recorded in the United States National Museum Bull. 100 v.4, with their respective lower limits as found in our biostratigraphic section.

	Type W			Type X			Type Y	Type Z		Recent
	L	M	U	L	M	U		L	U	
Anomalina ammoniodes (Reuss)										
Anomalina coronata Parker & Jones										
Bolivina alata (Seguenza)										
Bolivina hantkeniana Brady										
Bolivinita quadrilatera (Schwager)										
Bulimina ovata d'Orbigny										
Bulimina inflata Seguenza										
Bulimina pyrula d'Orbigny										
Cleवलina communis d'Orbigny										
Dentalina consobrina d'Orbigny										
Eponides margaritifera (Brady)										
Flintina bradyana Cushman										
Frondicularia plicata Cushman										
Gaudryina triangulatis Cushman										
Glandulina laevigata d'Orbigny										
Globigerina bulloides d'Orbigny										
Globigerina conglobata Brady										
Globigerinoides rubra (d'Orbigny)										
Gyroldina soldanii d'Orbigny										
Lagena hexagona (Williamson)										
Lenticulina convergens Bornemann										
Nodosaria lepidula Schwager										
var. hispidula										
Nodosaria pyrula d'Orbigny										
var. rugosa d'Orbigny										
Orbulina universa d'Orbigny										
Planorbulinella larvata (Parker and Jones)										
Planulina arimenensis d'Orbigny										
Polymorphina problema d'Orbigny										
var. indica Cushman										
Robulus costata (Fictel & Moll)										
var. multicosta Cushman										
Robulus costata (Fictel & Moll)										
var. subdecorata Cushman										
Siphogenerina raphenus Parker & Jones) var. costulata										
Uvigerina schageri Brady										
Uvigerina asperula Ozpek										
Uvigerina tenuistriata Reuss										





From U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 31

Fig. 1 - *Clavulina communis*  
d'Orbigny X 35

Fig. 6 - *Bulimina inflata*  
Sequenza X 75

From U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 61

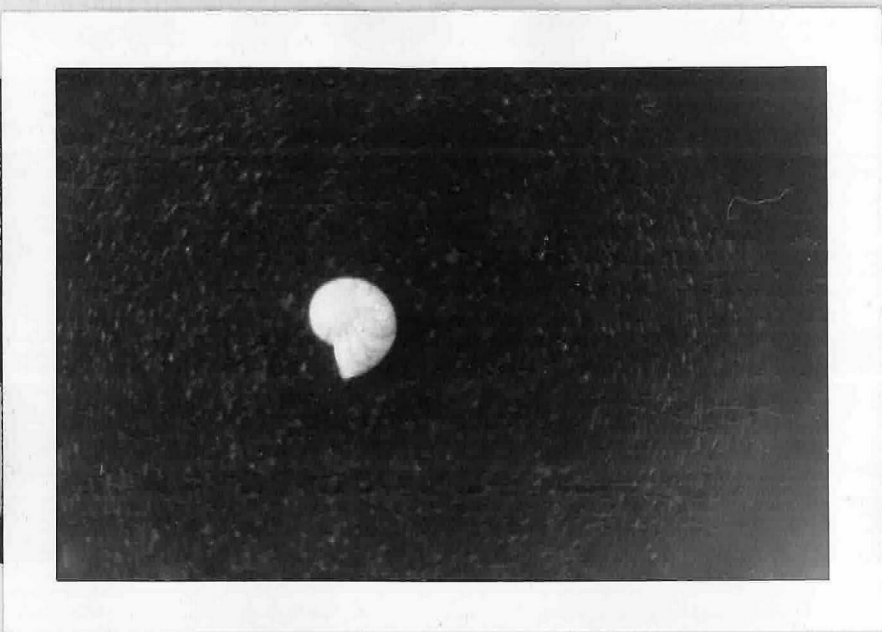
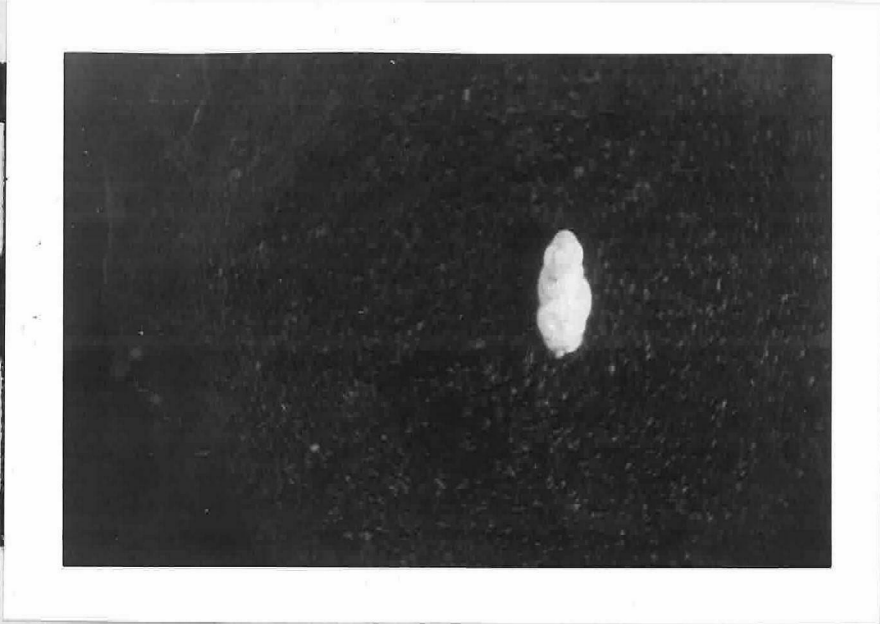
Fig. 1 - *Anomalina ammonoides*  
(Reuss) X 66

- a. ventral view
- b. dorsal view
- c. apertural view

From the U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 55  
*Uvigerina tenuistriata* Reuss  
X 82

60109

601 W



Bulimina 7

Bulimina inflata Seguenza

X 19

A T 09

Anomalina 5

Anomalina ammonoides (Reuss)

X 19

601 W

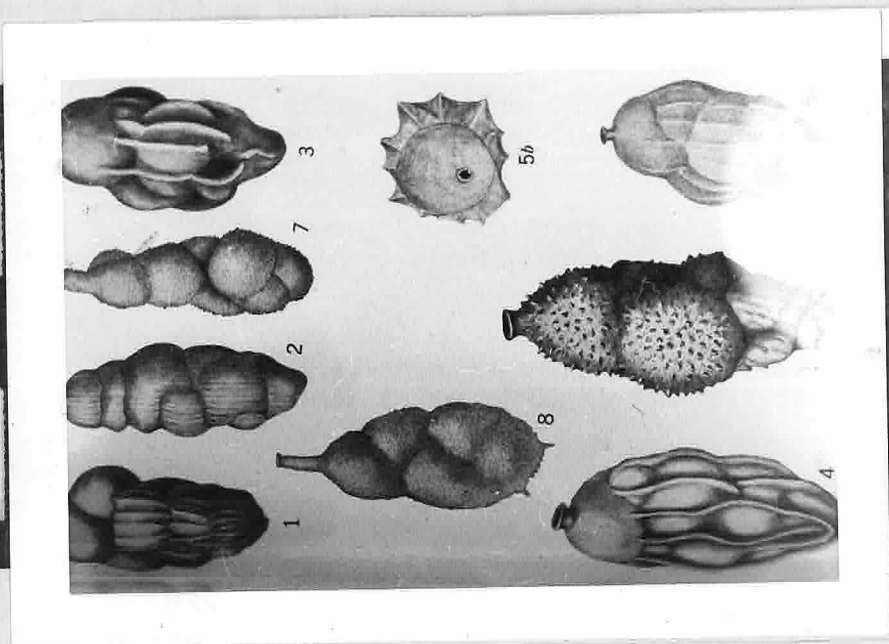
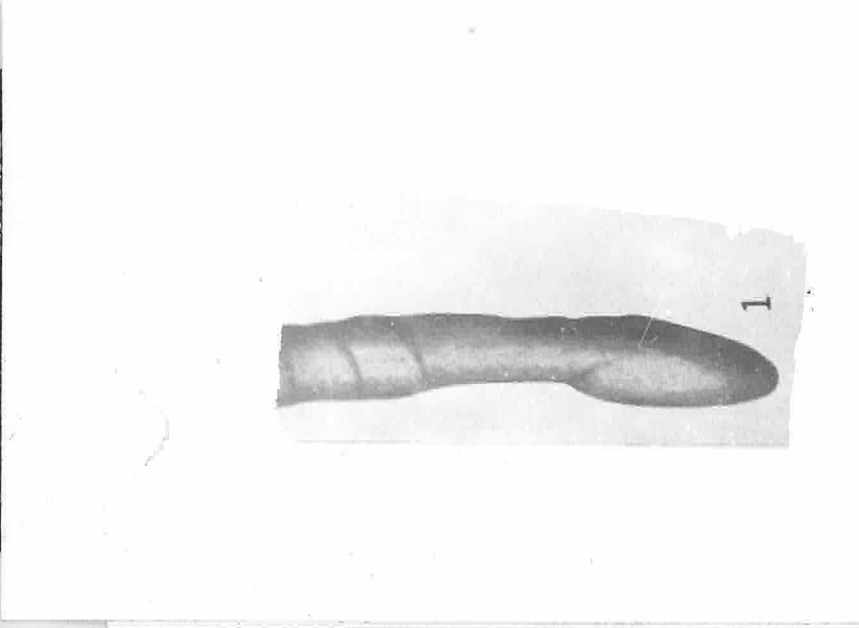
Uvigerina 24

Uvigerina tenuistriata Reuss

X 19

A T 09





Flintina 3

Flintina bradyana Cushman

X 20

601 W

From U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 55

Fig. 2 - *Uvigerina tenuistriata*

Reuss X 66

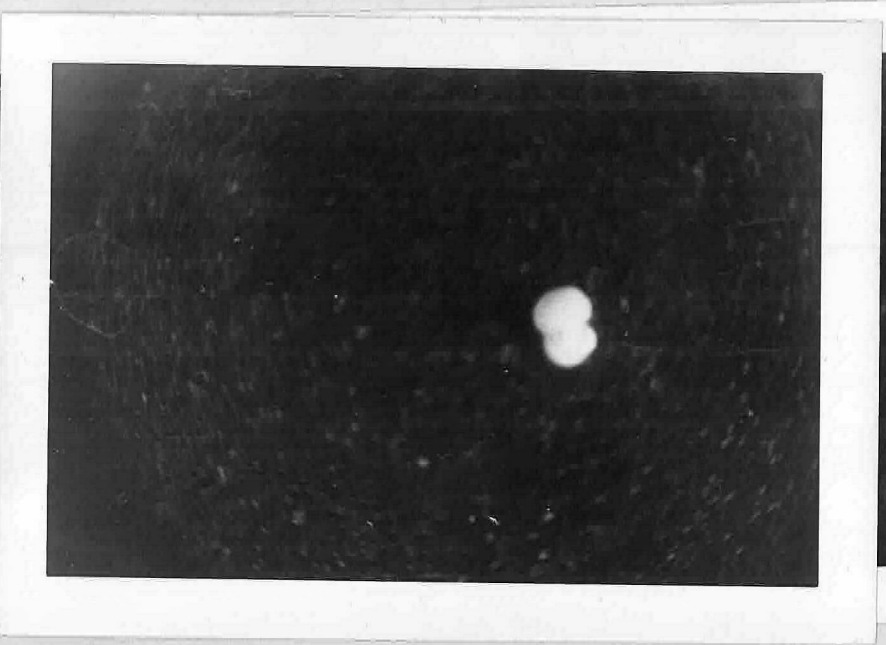
Fig. 3,4,5 - *Uvigerina schwageri*

Brady X 66

Fig. 8 - *Uvigerina asperula* Czjsek  
Foraminifera of the Philippine  
and Adjacent Seas

601 W

From the U.S. National Museum  
Bulletin 100, Vol. 4 Pl. 31  
*Clavulina communis* d'Orbigny  
X 44





Globigerina 2

Globigerina bulloides d'Orbigny

x 20

A 109

Uvigerina 18

Uvigerina asperula Ozjsek

x 20

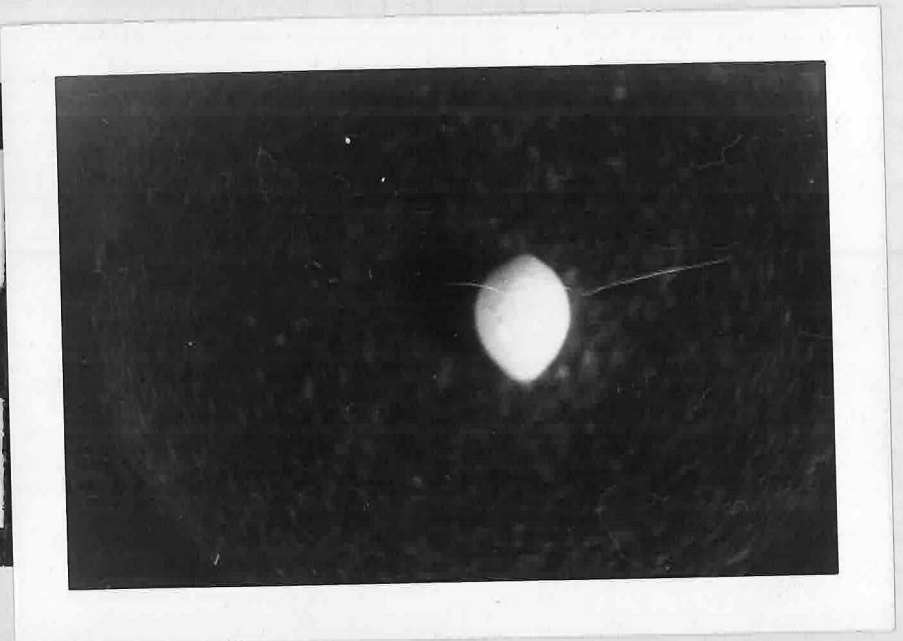
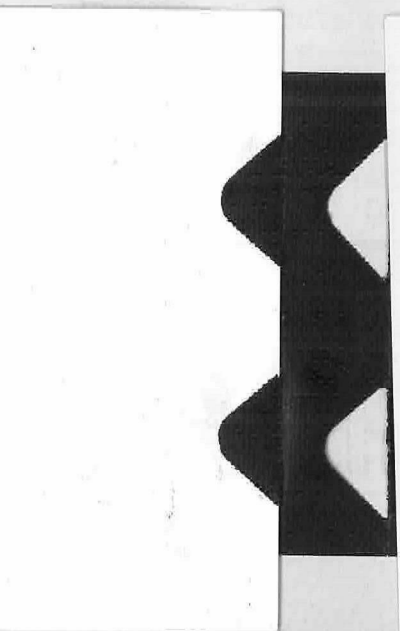
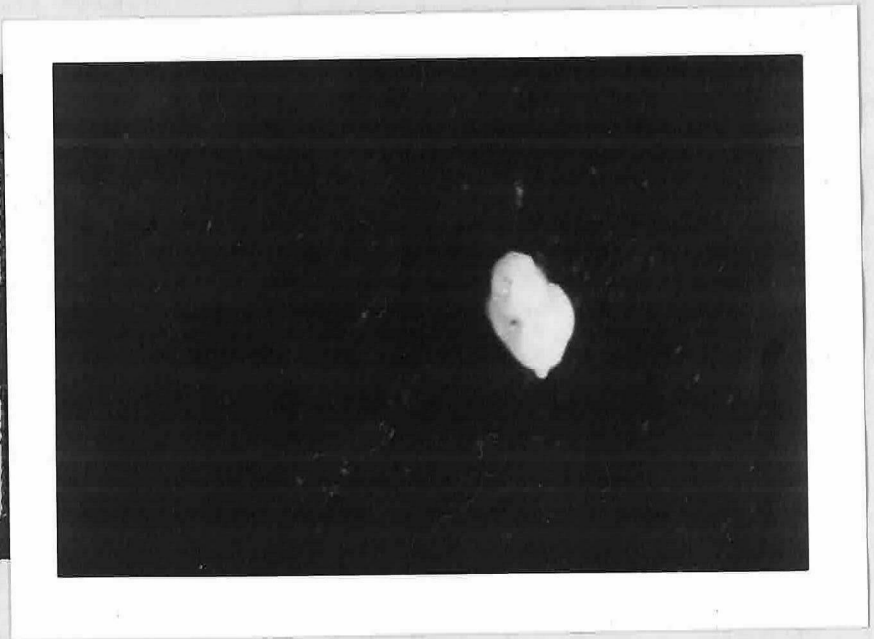
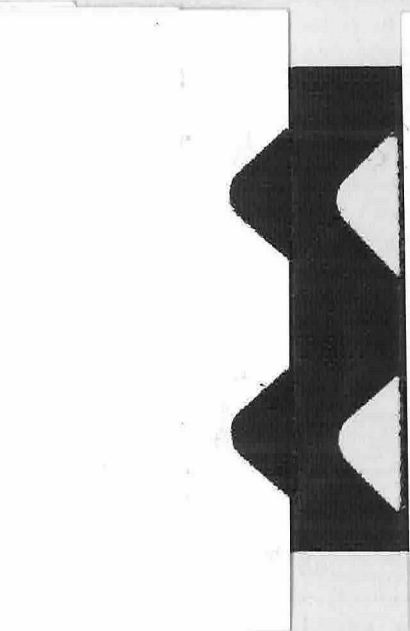
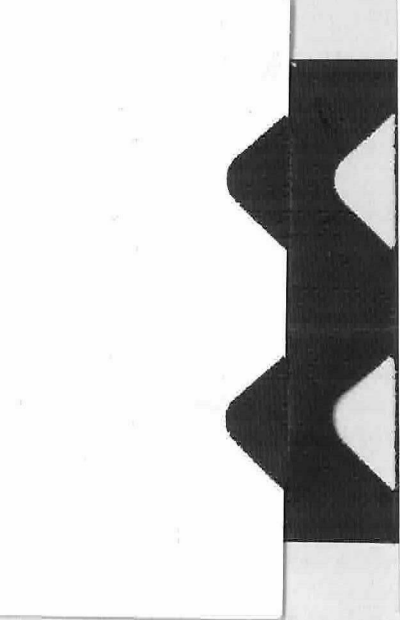
A 109

Clavulina 1

Clavulina communis d'Orbigny

x 19

A 109



Glandulina 1

Glandulina cf. laevigata  
d'Orbigny

X 20

601 W

Uvigerina 8

Uvigerina scwageri Brady

X 19

601 W

2

Lagena 11

Lagena cf. hexagona (Williamson)  
var. lata Goddard

X 19

601 W



Identified species also reported from the late tertiary of the Netherlands East Indies (Colorado School of Mines Quarterly, Vol. 26, no. 1 Jan. 1941) and their distribution in our biostratigraphic section.

	Type W			Type X			Type Y	Type Z		Recent
	L	M	U	L	M	U		L	U	
<i>Bolivina alata</i> (Seguenza)										
<i>Anomalina ammonoides</i> (Reuss)										
<i>Bolivina hantkeniana</i> Brady										
<i>Bolivinita quadfilatera</i> (Schwager)										
<i>Bulimina ovata</i> d'Orbigny										
<i>Bulimina inflata</i> Seguenza										
<i>Cassidulina subglobosa</i> Brady										
<i>Cassidulina delicata</i> Cushman										
<i>Cibicides pseudoCungarianus</i> (Cushman)										
<i>Dentalina consobrina</i> d'Orbigny										
<i>Eponides margaritiferus</i> (Brady)										
<i>Glandulina laevigata</i> d'Orbigny										
<i>Globigerina bulloides</i> d'Orbigny										
<i>Globigerina conglobata</i> Brady										
<i>Globigerinoides rubra</i> (d'Orbigny)										
<i>Gyroidina soldanii</i> d'Orbigny										
<i>Nodosaria lepidula</i> var. <i>hispidula</i>										
<i>Nodosaria pyrula</i> var. <i>rugosa</i>										
<i>Orbulina universa</i> d'Orbigny										
<i>Planorbulinella larvata</i> (Parker & Jones)										
<i>Plectofrondicularia vaughani</i> Cushman										
<i>Pseudoglandulina acuta</i> Le Roy										
<i>Robulus costata</i> (Fictel and Moll)										
<i>Uvigerina hispida</i> Schwager										
<i>Uvigerina schwageri</i> Brady										
<i>Uvigerina asperula</i> Ozjsek										

Species that show affinities or compare well with the Foraminifera from the Miocene of California as Recorder by R.M. Kleinpell ("Miocene Stratigraphy of California " The American Association of Petroleum Geologist)

Anomalina californiensis Cushman and Hobson  
Anomalina salinasensis Kleinpell  
Bolivina marginata Cushman  
Bolivina melanaensis Kleinpell  
Bolivina californica Cushman  
Bolivina advena var. ornata Cushman  
Bolivina goudkoffi Rankin  
Bolivina vigheni Natland  
Bolivina advena var. striatella Cushman  
Bolivina brevior Cushman  
Bolivina modeloensis Cushman & Kleinpell  
Bolivina barbarana Cushman and Kleinpell  
Bulimina rinconensis Cushman and Laiming  
Bulimina corrugata Cushman and Siegfus  
Bulimina ovula d'Orbigny  
Bulimina inflata var. alligata Cushman and Laiming  
Bulimina pseudotorta Cushman  
Buliminella subfusiformis Cushman  
Buliminella curta Cushman  
Buliminella brevior Cushman  
Cassidulina modeloensis Rankin  
Cassidulina crassa d'Orbigny  
Cibicides americanus Cushman  
Dentalina spinosa d'Orbigny  
Dentalina quadrulata Cushman

*Dentalina multilineata* Bornemann  
*Dentalina acuta* d'Orbigny  
*Eponides guyablensis* Cole  
*Frondicularia foliacea* Schwager  
*Frondicularia advena* Cushman  
*Guttulina hughesi* Cushman and Laiming  
*Marginulina dubia* Neugeboren  
*Marginulina subbullata* Guembel  
*Nodosaria arundinea* Schwager  
*Nodosaria acuminata* Hantken  
*Nodosaria perexilis* Cushman and K.O. Stewart  
*Nonionella miocenica* Cushman  
*Plectofrondicularia miocenica* Cushman  
*Plectofrondicularia californica* Cushman and Stewart  
*Plectofrondicularia cookei* Cushman  
*Pullenia bulloides* d'Orbigny  
*Pullenia salisbury* R.E. and K.O. Stewart  
*Saracenaria schencki* Cushman and Hobson  
*Siphogenerina kleinpelli* Cushman  
*Textularia mexicana* Cushman  
*Textularia shivelyi* Kleinpell  
*Uvigerina glabrans* Cushman  
*Uvigerina gallowyi* Cushman  
*Uvigerina auberiana* d'Orbigny  
*Uvigerina hootsi* Renkin  
*Uvigerina tenuistriata* Reuss  
*Valvulineria casitasensis* Cushman and Laiming  
*Valvulineria californica* var. *appressa* Cushman

#### A C K N O W L E D G M E N T

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